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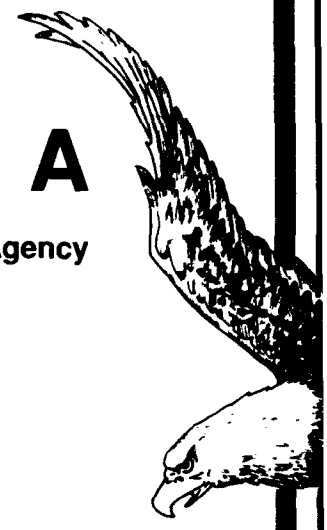

U S A T H A M A

U.S. Army Toxic and Hazardous Materials Agency

Report of Sampling and Analysis Results

Elrama Army Housing Units
Elrama, Pennsylvania

August 1990

Prepared for:

U.S. Army Toxic and Hazardous Materials Agency
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Roy F. Weston, Inc. has conducted a sampling and analysis program of the Army housing property located in Elrama, Pennsylvania. The objectives of this effort include further characterization of environmental contamination identified in an enhanced preliminary assessment carried out in 1989. The specific activities performed at this site were identification, evaluation of the condition, and collection of samples from specific suspected asbestos-containing materials, including floor tiles, pipe run and pipe fitting insulation, dust in the ductwork, and exterior siding, where present. These evaluations were necessary to clarify potential environmental issues identified in the earlier report, prior to the sale or realignment of the property.

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SAMPLING AND ANALYSIS AT THE U.S. ARMY FAMILY HOUSING UNIT (FHU) PROPERTY ELRAMA, PENNSYLVANIA

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EXECUTIVE SUMMARY

The U.S. Army family housing units (FHUs) at Elrama, Pennsylvania were inspected by Roy F. Weston, Inc. (WESTON) personnel during March 1990 to further evaluate the environmental concerns identified in the enhanced Preliminary Assessment reports prepared and submitted earlier by Argonne National Laboratory (ANL) for the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA). Three of the 16 single-family "Capehart" housing units were examined on 02 and 06 March to investigate the possible presence of asbestos-containing materials (ACM). Airborne asbestos at this site was not sampled to determine the impact, if any, of asbestos fibers that were detected in the dust deposited in the ductwork of the heating system. During the follow-up study by a WESTON Certified Industrial Hygienist there was no available vacant housing unit in which to collect the necessary samples.

The ANL Draft Sampling and Analysis Plan, Revision 1 (SAP) specified sampling the following materials, where present, which are suspected to contain asbestos, from ten per cent of the housing units or a minimum of three housing units, whichever is greater.

- Pipe run insulation.
- Dust accumulated inside heating ductwork within the concrete slab, where present and open.
- Vinyl floor tiles.

The WESTON personnel selected three housing units for inspection after review of maintenance records and drawings, discussions with housing management personnel, and determination that the units were in similar condition. The housing units chosen, Nos. S-086, S-099, and S-100, were considered to be representative of the other 13 units, but this was not confirmed by an examination of all the units.

Twelve dust samples, 14 samples of floor tile, and six samples of attic pipe run insulation were collected by WESTON and analyzed. These analyses revealed that asbestos is present in dust accumulated within the heating ductwork in floor tile and in pipe run insulation in the attic at the three housing units examined. Asbestos was found in five of the 12 dust samples by transmission electron microscopy (TEM) in samples from each unit. Asbestos was quantified at 1% or greater by polarized light microscopy (PLM) in all 14 floor tile samples. Asbestos was found at or greater than 5% in all six pipe run insulation samples by PLM. During the asbestos sampling activity, other suspect materials observed were expansion joints on the heating units and roofing materials.

The following practices should be observed with regard to the known and suspected asbestos-containing materials identified:

- The friable asbestos-containing pipe run insulation in the attic, is in an inaccessible location and may be left in place as long as it is not disturbed. However, an Operations and Maintenance (O&M) plan must be developed and implemented. This plan must describe the locations of all known ACM, procedures for its maintenance, repair and removal, and personnel responsible for its implementation. The O&M program must remain in force until such time as all ACM is removed from the facility.

- The risks posed by the asbestos-containing dust in the ductwork cannot be clearly evaluated, because the sampling and analysis program only included a qualitative screening of this material since no approved quantitative procedure exists. Further studies, such as air sampling, were performed at other sites to determine if the asbestos is becoming airborne and to define what risks, if any, are presented by these findings. Since there were no vacant units at this facility, no airborne asbestos samples were collected.

- The vinyl floor tiles pose no significant risk as long as they are in good condition and are not damaged by excessive wear or misuse. They should be managed in place under an O&M program which describes procedures for the regular inspection of the floor coverings and the removal and replacement of any that become damaged.

- Other suspect materials identified but not sampled, including roofing materials and expansion joints in the heating ductwork, should be assumed to contain asbestos and managed in place under an O&M program until they are either removed or determined to contain no asbestos.

SECTION 1. INTRODUCTION

SAMPLING AND ANALYSIS AT THE U.S. ARMY FAMILY HOUSING UNIT (FHU) PROPERTY ELRAMA, PENNSYLVANIA

SECTION 1. INTRODUCTION

Roy F. Weston, Inc. (WESTON) was retained by Argonne National Laboratory (ANL) to provide assistance in gathering additional environmental data for the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) at 53 family housing unit (FHU) properties in 12 states. The Elrama, Pennsylvania property is one of these FHUs.

1.1 PURPOSE AND SCOPE

The purpose of this project was to provide the Department of the Army with sound environmental data on the properties which are scheduled for sale or realignment as a result of the Defense Authorization Amendments and Base Closure and Realignment Act (Public Law 100-526). Environmental assessments of each property covered by the Act are required by the Secretary of Defense prior to their closure or realignment. Such actions must be performed in accordance with applicable provisions of the National Environmental Policy Act (NEPA) to ensure that any environmental hazards will be identified and mitigated where required.

Previously, ANL conducted enhanced preliminary assessments (PAs) for each property. These enhanced PAs made recommendations regarding sampling and analysis to determine (1) whether and in what quantities asbestos is present in certain building construction materials (including pipe run insulation, dust accumulated in heating ductwork, vinyl floor tile, and exterior siding shingles, where present), (2) in selected contexts, whether and in what concentration soils and groundwater may be contaminated, and (3) whether and in what range transformer oils at selected sites may contain polychlorinated biphenyls (PCBs). WESTON gathered this data by implementing ANL's Draft FHU Sampling and Analysis Plan, Revision 1 (SAP). Subsequent to the initial studies, WESTON, ANL, and USATHAMA decided that a follow-up effort was required to determine if asbestos fibers were becoming airborne from the dust in the heating system. This study was implemented, but no samples were collected at this site, because no vacant unit was available for sampling.

1.2 SITE DESCRIPTION

The Department of the Army's FHU property in Elrama, Pennsylvania consists of 16 single-family housing units located on 14.18 acres. The housing area is located on both sides of a cul-de-sac road connecting with Coral Bluff and Gilmore.

The three-bedroom "Capehart"-style single-family housing units were constructed in 1959. The single-story, wood-frame units were built on concrete slab foundations with no basements or crawl spaces. The ducts for the original heating system and domestic water lines were embedded in the concrete slab, which was covered with vinyl floor tile. The units have pitched roofs surfaced with asphalt shingles and exteriors finished with wood siding.

1.3 REPORT ORGANIZATION

This report contains the results of the sampling and analysis program performed by WESTON. Section 2 contains a description of the asbestos sampling performed at the property and laboratory results for samples of suspected asbestos-containing material (ACM) collected. Copies of field notes and laboratory results pertaining to asbestos are provided in Appendices A.1 and A.2.

SECTION 2. ASBESTOS-CONTAINING MATERIALS

SECTION 2. ASBESTOS-CONTAINING MATERIALS

WESTON personnel inspected three of the 16 "Capehart" units at the Elrama family housing facility on 02 and 06 March 1990 for the presence of suspected ACM. Vinyl floor tile, pipe run insulation, and dust accumulated within the heating ductwork were the only suspect materials found within the buildings that were sampled. All sampling was done following the requirements of ANL's SAP. Additionally, all field work was performed in accordance with applicable Federal regulations, including 40 CFR Part 61 Subpart M, 40 CFR Part 763 Subpart E, and 29 CFR Part 1910.1001.

2.1 SAMPLING RATIONALE

The sampling rationale used by WESTON for this project followed the recommendations set forth by ANL. The type of suspect ACM to be sampled, the number of housing units to be examined at each FHU facility, and number of samples to be taken for each material found were described in the SAP. The plan for Elrama required sampling of the following materials, if present:

- Pipe run insulation.
- Accumulated dust inside heating ductwork if not sealed.
- Vinyl floor tiles.

In accordance with the SAP, three units were examined at this facility. The sampling plan, however, did not identify specific units which were to be sampled. The task of determining which housing units were representative of the facility as a whole and, therefore, would be sampled was left to the WESTON field team. After reviewing all available maintenance records and drawings and discussing the facility with Directorate of Engineering and Housing (DEH) personnel, it was determined that all of the units at the Elrama FHU were similar in condition. Units S-086, S-099, and S-100, were chosen by the WESTON field team leader as representative units to be sampled.

The SAP specifies that a minimum of two pipe run insulation samples, four dust samples, and one sample of each color of floor tile be collected from each of the housing units examined. Twelve dust samples, six pipe run insulation samples, and 14 samples of vinyl floor tiles were collected at the facility.

2.2 FIELD ACTIVITIES AND OBSERVATIONS

Each of the units was inspected to determine if suspect materials were present. Samples of the attic pipe fitting insulation were retrieved using a disposable coring device with a one-half inch diameter tube, designed such that the coring device also serves as the sampling containers. Before the coring tool was inserted, the materials to be sampled were moistened to prevent asbestos fibers from becoming airborne. The coring device was placed in its outer sample container and secured by a tight fitting lid. The containers were labeled with sample numbers, and shipped to the lab. The sampling tools were wiped clean with a damp cloth and all debris resulting from the sampling activities as collected and placed into plastic bags. The small bore hole was sealed with an encapsulant.

Two samples of pipe fitting insulation were taken from the attic of each unit. The pipe run insulation is friable, as defined in the Environmental Protection Agency (EPA) regulations, meaning that it can be

crushed, crumbled, pulverized, or otherwise reduced to a powder using hand pressure. Friable ACM is considered to be more hazardous than non-friable ACM since it is much more likely to release asbestos fibers. Because of its friability and instances of damage, the pipe run insulation is considered to be the most hazardous type of ACM in the Elrama FHU. However, its inaccessible location in the attic lessens the possibility of damage by and exposure risk to the occupants.

Heating ductwork vents in the units were not sealed, so dust samples were collected by wiping the inner surface of the duct near the designated exhaust vents with a fiber-free wipe selected for its ability to trap dust in a non-fibrous matrix. Each wipe was placed in the jaws of a flexible small parts pick-up tool and moistened with fiber free water. The grille was then removed and the tool inserted into the duct opening. The interior surface was wiped to collect dust on the moistened surface of the wipe. After the dust was gathered, the wipe was placed in a small plastic wide-mouth jar, sealed, labeled with the sample number, and shipped to the lab. The grille was then replaced and the tool was cleaned by rinsing and wet wiping the surfaces prior to collecting the next sample. Samples were collected from the living room, bedroom, and main bathroom in all three units.

Eight colors, light red, red, gray, black, off-white, gray-green, tan, and brown, of 9" x 9" vinyl floor tile were sampled. All three units contained black floor tile. Units S-86 and S-99 contained red, gray, off-white, and gray-green floor tile. Unit S-86 contained light red floor tile, and Unit S-100 contained tan and brown floor tile. One sample of each of the floor tile types was taken in each housing unit, resulting in a total of 14 samples for laboratory determination of asbestos content. These samples were taken by breaking off a small piece of floor tile in an inconspicuous location. About one square inch of the tile surface area was taken for each sample. No effort was made to separate the mastic, which sometimes contains asbestos, from the floor tile samples themselves.

The vinyl floor tile in all three of the units inspected was in good condition. This material is considered to be a non-friable type of ACM, unless damaged. If significant damage occurs, such that the material becomes friable as defined in the asbestos National Emission Standard for Hazardous Air Pollutants (NESHAP), the U. S. Environmental Protection Agency (EPA) would classify these tiles as friable materials. However, an EPA interpretation was recently released that changes certain previous interpretations regarding non-friable ACM. On 23 February 1990, a memorandum was written by the Director of Emissions Standards Division, the Director of Stationary Source Compliance Division, and the Associate Enforcement Counsel for Air Enforcement of the EPA Office of Air Quality Planning and Standards (OAQPS). This memorandum was circulated to other air quality officials and EPA regional offices in early March 1990. This latest position states that floor tiles and certain other non-friable materials do not have to be removed from a facility prior to demolition, unless they are severely damaged and thus are considered friable, or unless the demolition may cause fiber release through grinding or abrasion of the tiles. Floor tile removal shall be done if demolition is to be accomplished by burning, either of the unit or of the debris from demolition. However, if the floors in the housing units are to be renovated, special care must be taken during the process to prevent the release of asbestos fibers.

The WESTON field team was directed, as a part of the project scope contained in the SAP, to perform sampling and analysis of specific suspect ACM. Other suspect materials observed were expansion joints on the heating units and roofing materials. Copies of the field notes are included in Appendix A.1.

2.3 LABORATORY PROCEDURES AND RESULTS

The bulk samples of building materials were analyzed for asbestos content by WESTON's optical microscopy laboratory in Auburn, Alabama. This laboratory is accredited by the American Industrial Hygiene Association (AIHA) and the National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP). The bulk samples were analyzed by Polarized Light Microscopy (PLM) using the EPA's "Interim Method for the Determination of Asbestos in Bulk Insulation Samples", EPA 600/M4-82-020, December 1982. Copies of the laboratory reports are included in Appendix A.2.

Vinyl floor tile samples for which no asbestos was found using PLM methods and wipe samples of dust accumulated within heating ductwork were analyzed qualitatively for the presence of asbestos by Transmission Electron Microscopy (TEM) at WESTON's NVLAP accredited electron microscopy laboratory in Auburn, Alabama. Copies of these laboratory reports are also included in Appendix A.2.

All analyses were performed in accordance with protocols set forth in the Laboratory Accreditation package submitted by WESTON under NVLAP. This document includes standard procedures for sample analysis and quality assurance/quality control (QA/QC) which were acceptable to NIST. The QA/QC protocols for the laboratory differ significantly from those commonly found in chemical analysis procedures, due to the nature of the analytical procedure. Since there are no reagents, digestions, or other steps in the process that provide significant opportunities for sample contamination or analyte loss, lot blanks and sample spikes are not performed. Instead, all analyses are performed using the following steps:

- Incoming samples are divided into lots of ten for analysis.
- One sample is selected at random to serve as the QC check and divided into two containers.
- The sample lot is assigned to an analyst who determines the asbestos content of each sample.
- The QC sample is analyzed by a different analyst, designated by the sample custodian.
- The results of both analysts are submitted to the QC Coordinator for review, and comparison to the laboratory QC chart.
- The results are reviewed and approved, based on the written QC review procedures, or rejected. If rejected, the sample lot and QC sample are reanalyzed.

The WESTON laboratory routinely runs blank checks to ensure that equipment and refractive index oils are not contaminated, collects and analyzes samples of the air in the work areas to document that airborne asbestos fibers do not threaten worker health or contaminate samples, and analyzes samples submitted by NIST to document precision of results as required by the NVLAP program. Samples provided in past rounds of proficiency checks are used for analyst training and to document analyst proficiency. The use of third party laboratory comparisons is often done, and is accomplished by sending duplicates of samples to an outside laboratory and comparing the results obtained by the two facilities.

In interpreting the asbestos results, it should be noted that the definition of asbestos presence differs between the EPA and some state agencies. According to the EPA definition, any materials that contain greater than one per cent (>1%) asbestos are classified as ACM by the 1977 NESHAP regulations. However, California has recently implemented state regulations that consider all materials containing 0.1 per cent or more asbestos as asbestos-containing. It is believed that several other states will soon follow the lead of California in lowering the threshold limit to 0.1 per cent, including some in which properties under review in this study are located. Currently, the State of Pennsylvania continues to abide by the EPA definition, hence, all samples containing >1% asbestos are considered to be ACM.

The matter is further complicated by the fact that the PLM method was developed specifically for friable materials, but not for non-friable types of suspect ACM such as vinyl floor tiles, vinyl sheeting, and siding. In fact, no specific method has been developed and promulgated to date for such samples, so laboratories use PLM as the only available documented procedure for their analysis. PLM has an inherent limitation on fiber resolution of about 0.25 micrometer (um) in diameter, while reliable detection and quantification of fibers smaller than 1 um in diameter is difficult. The manufacturing process for vinyl floor tiles, for example, often produces the very small fiber diameters which cannot be seen by PLM. WESTON's experience is that frequently such samples do, in fact, contain significant quantities of asbestos. WESTON has developed a qualitative technique using TEM to detect the presence of such small fibers and minimize false negatives in the laboratory results. This technique, however, does not allow a good quantitative estimate of asbestos content.

For these reasons, the WESTON laboratories have implemented a policy of reporting asbestos presence as follows:

- Asbestos determined by PLM to be present at greater than 1% is reported as the quantity detected.
- If asbestos is estimated to be less than 1% by PLM, it is reported as "<1%". This estimate of asbestos content may be made when only one asbestos structure is observed.
- If asbestos is not detected in certain non-friable materials by PLM, then the samples are subjected to TEM analysis. The results are reported as positive if asbestos is detected by TEM.

Recommendations made in this report are based on the >1% regulatory limit, except for floor tiles as discussed earlier and except as otherwise noted. However, all samples in which asbestos was detected are discussed. This represents a conservative approach to the assessment of asbestos presence at the facility.

Table 2.1 contains a summary of all samples collected at the Elrama FHU, including sample locations, material descriptions, and laboratory results. PLM results are quantitative while TEM results are qualitative. Quantity estimates for materials sampled that were suspected to contain asbestos are presented in Table 2.2. The field notes describing the observations are provided in Appendix A.1, while copies of the original laboratory reports are included as Appendix A.2.

All six samples of pipe run insulation were found to contain the chrysotile type of asbestos in a friable form at concentrations at or greater than 5% using the PLM technique for analysis. Based on these observations, the pipe run insulations should be considered to contain asbestos.

TABLE 2.1
BULK SAMPLE SUMMARY
ELRAMA FAMILY HOUSING

SAMPLE IDENTIFICATION	MATERIAL TYPE	LOCATION	ASBESTOS CONTENT PLM ANALYSIS	CONFIRMATION TEM ANALYSIS
Unit S86				
BU341-28-PA-S86-API	Pipe run insulation	Attic	Chrysotile, 10%	
BU342-28-PA-S86-API	Pipe run insulation	Attic	Chrysotile, 5%	
BU343-28-PA-S86-AFT	Lt red 9" x 9" floor tile	Kitchen	Chrysotile, 3%	
BU344-28-PA-S86-AFT	Red 9" x 9" floor tile	Kitchen	Chrysotile, 3%	
BU345-28-PA-S86-AFT	Gray 9" x 9" floor tile	All bedrooms/Bath 1/ Bath 2/Living room/Hall	Chrysotile, 3%	
BU346-28-PA-S86-AFT	Black 9" x 9" floor tile	All bedrooms/Hall/ Living room	Chrysotile, 2%	
BU347-28-PA-S86-AFT	Off-white 9" x 9" floor tile	Bath 1	Chrysotile, 1%	
BU348-28-PA-S86-AFT	Gray-green 9" x 9" floor tile	Bath 1/Hall	Chrysotile, 2%	
BU349-28-PA-S86-ATD	Dust within ductwork	Kitchen	---	Negative
BU350-28-PA-S86-ATD	Dust within ductwork	Bath 2	---	Negative
BU351-28-PA-S86-ATD	Dust within ductwork	Living room	---	Positive
BU352-28-PA-S86-ATD	Dust within ductwork	Bedroom 2	---	Positive
Unit S99				
BU397-28-PA-S99-AFT	Red 9" x 9" floor tile	Hall/Kitchen	Chrysotile, 3%	
BU398-28-PA-S99-AFT	Gray 9" x 9" floor tile	All bedrooms/Bath 1/ Bath 2/Hall/Living room	Chrysotile, 3%	
BU399-28-PA-S99-AFT	Gray-green 9" x 9" floor tile	Hall/Bath 2	Chrysotile, 2%	
BU400-28-PA-S99-AFT	Off-white 9" x 9" floor tile	Hall/Living room	Chrysotile, 3%	
BU401-28-PA-S99-AFT	Black 9" x 9" floor tile	All bedrooms/Hall/ Living room	Chrysotile, 3%	
BU402-28-PA-S99-ATD	Dust within ductwork	Bath 2	---	Negative
BU403-28-PA-S99-ATD	Dust within ductwork	Bedroom 1	---	Negative
BU404-28-PA-S99-ATD	Dust within ductwork	Living room	---	Positive
BU405-28-PA-S99-ATD	Dust within ductwork	Bedroom 2	---	Negative
BU406-28-PA-S99-API	Pipe run insulation	Attic	Chrysotile, 5%	
BU407-28-PA-S99-API	Pipe run insulation	Attic	Chrysotile, 10%	
Unit S100				
BU408-28-PA-S100-AFT	Black 9" x 9" floor tile	Kitchen	Chrysotile, 3%	
BU409-28-PA-S100-AFT	Tan 9" x 9" floor tile	All rooms	Chrysotile, 3%	
BU410-28-PA-S100-AFT	Brown 9" x 9" floor tile	All bedrooms/Hall/ Living room	Chrysotile, 3%	
BU411-28-PA-S100-ATD	Dust within ductwork	Bath 2	---	Negative
BU412-28-PA-S100-ATD	Dust within ductwork	Living room	---	Negative
BU413-28-PA-S100-ATD	Dust within ductwork	Bedroom 2	---	Positive
BU414-28-PA-S100-ATD	Dust within ductwork	Bedroom 3	---	Positive
BU415-28-PA-S100-API	Pipe run insulation	Attic	Chrysotile, 5%	
BU416-28-PA-S100-API	Pipe run insulation	Attic	Chrysotile, 25%	

TABLE 2.2
ASBESTOS CONTAINING MATERIALS
ELRAMA FAMILY HOUSING

SAMPLE IDENTIFICATION	MATERIAL TYPE	LOCATION	QUANTITY	UNITS
Unit S86				
BU341-28-PA-S86-API	Pipe run insulation	Attic	10	Linear ft
BU342-28-PA-S86-API	Pipe run insulation	Attic	10	Linear ft
BU343-28-PA-S86-AFT	Lt red 9" x 9" floor tile	Kitchen	35	Square ft
BU344-28-PA-S86-AFT	Red 9" x 9" floor tile	Kitchen	35	Square ft
BU345-28-PA-S86-AFT	Gray 9" x 9" floor tile	All bedrooms/Bath 1/ Bath 2/Living room/Hall	792	Square ft
BU346-28-PA-S86-AFT	Black 9" x 9" floor tile	All bedrooms/Hall/ Living room	38	Square ft
BU347-28-PA-S86-AFT	Off-white 9" x 9" floor tile	Bath 1	4	Square ft
BU348-28-PA-S86-AFT	Gray-green 9" x 9" floor tile	Bath 1/Hall	12	Square ft
BU351-28-PA-S86-ATD	Dust within ductwork	Living room	N/A	
BU352-28-PA-S86-ATD	Dust within ductwork	Bedroom 2	N/A	
Unit S99				
BU397-28-PA-S99-AFT	Red 9" x 9" floor tile	Hall/Kitchen	92	Square ft
BU398-28-PA-S99-AFT	Gray 9" x 9" floor tile	All bedrooms/Bath 1/ Bath 2/Hall/Living room	884	Square ft
BU399-28-PA-S99-AFT	Gray-green 9" x 9" floor tile	Hall/Bath 2	14	Square ft
BU400-28-PA-S99-AFT	Off-white 9" x 9" floor tile	Hall/Living room	4	Square ft
BU401-28-PA-S99-AFT	Black 9" x 9" floor tile	All bedrooms/Hall/ Living room	39	Square ft
BU404-28-PA-S99-ATD	Dust within ductwork	Living room	N/A	
BU406-28-PA-S99-API	Pipe run insulation	Attic	10	Linear ft
BU407-28-PA-S99-API	Pipe run insulation	Attic	10	Linear ft
Unit S100				
BU408-28-PA-S100-AFT	Black 9" x 9" floor tile	Kitchen	80	Square ft
BU409-28-PA-S100-AFT	Tan 9" x 9" floor tile	All rooms	914	Square ft
BU410-28-PA-S100-AFT	Brown 9" x 9" floor tile	All bedrooms/Hall/ Living room	39	Square ft
BU413-28-PA-S100-ATD	Dust within ductwork	Bedroom 2	N/A	
BU414-28-PA-S100-ATD	Dust within ductwork	Bedroom 3	N/A	
BU415-28-PA-S100-API	Pipe run insulation	Attic	10	Linear ft
BU416-28-PA-S100-API	Pipe run insulation	Attic	10	Linear ft

All 14 of the floor tile samples were found by PLM to contain asbestos at or greater than the 1% level. WESTON considers the 1% value reported for Sample BU-347-28-PA-586-AFT to be sufficient to define the samples as asbestos-containing, due to the analytical uncertainty of the PLM method when applied to floor tiles, previously discussed. The 13 units not inspected should be considered to have ACM present in the floor tiles unless additional sampling and analysis is performed and shows that no asbestos is present in these units.

Analytical results for the dust samples taken from the heater ductwork indicate that this dust contains some asbestos fibers. Qualitative TEM analyses revealed the presence of asbestos in five of the 12 dust samples. Samples from each unit had detectable asbestos fibers. These data lead to the conclusion that asbestos is found in the dust trapped by the heating ducts.

2.4 CONCLUSIONS AND RECOMMENDATIONS

The sample analyses performed by WESTON have revealed that asbestos is present in most floor tile samples collected in the three housing units examined, in pipe run insulation samples, and that the dust inside the heater supply ducts contains asbestos. These units are thought to be representative of the other 13 at the site, but this was not confirmed by sampling all units.

Analytical results of the pipe run insulation confirmed that asbestos is present in all six of the samples taken. This insulation is located in the attic above the ceiling, and may be left in place as long as the attic is not used for storage and the insulation is undisturbed. If the material is left in place, an Operations and Maintenance (O&M) Program should be developed and implemented. An O&M program must address the following:

- The locations of all known and suspected ACM.
- The procedures and frequency for periodically assessing the ACM in the facility.
- The procedures for safely handling the ACM during maintenance or removal activities.
- Designation of an asbestos coordinator for the facility.
- The responsibilities and requirements for training of personnel involved with maintenance and renovation of the facility.
- The record-keeping program for the facility.

All of the asbestos-containing pipe run insulation must by removed prior to a planned renovation of the plumbing system or demolition of the units.

The asbestos dust accumulated within the heating ductwork represents an unusual problem, since the source of this asbestos is not readily apparent, and the quantity is not precisely known. As a conservative approach, the heating ductwork located within the concrete slab should be cleaned or permanently sealed when the units are renovated. Since the heating systems are currently operational, sealing the floor vents will require

replacement with attic ducts and ceiling vents, or provisions of an alternate heating source. If the ducts are cleaned, a high-powered vacuum cleaner equipped with a high-efficiency particulate air (HEPA) filter should be employed, since other vacuum cleaners are not capable of trapping all of the small asbestos fibers that may be present.

The source of the asbestos in the ducts cannot be positively determined, due to the sampling and analysis procedures employed. However, there are several potential sources, based on observations at the numerous facilities inspected during this project. Units, presumed to be the original heaters, found at other facilities frequently contained an expansion joint which served to isolate the return air plenum from the heater itself, preventing the transmission of vibrations and noise to the ductwork. The fabric-like material used to form this joint was determined, in some cases, to be chrysotile asbestos in a nearly pure form. It is possible, even likely, that the heating systems in these units had similar expansion joints which have been removed. During the 25 to 30 years that the original units were in service, erosion of these joints was likely, and could have caused asbestos fibers to accumulate in the dust.

Another possibility is that residual debris from the removal of vinyl-asbestos floor tiles, such as was found in other sites, may have been left in the ducts during floor tile removal and replacement. Conversations with the TEM analysis indicate that there was some evidence of chlorine observed during the identification of the asbestos fibers by X-ray dispersion analysis in samples from some sites. The most likely source of this element, considering the site history, is the vinyl chloride polymer which forms the floor tile matrix. However, other asbestos sources, such as debris imported into the facilities from outside activities of the occupants, cannot be ruled out.

Sampling and analysis for airborne asbestos was not performed at this site during the original study due to the lack of an available vacant housing unit during the time of that effort. However, it is recommended by the U.S. Army Environmental Hygiene Agency (AEHA) that, if the units are to remain under the management, operational control, or ownership of the Army, sampling and analysis for airborne asbestos be undertaken. These studies should be performed to provide data from at least ten percent or a minimum of three of the housing units, whichever is greater. This additional sampling and analysis effort, along with the other recommended actions, will help to ensure that there is no long-term exposure risk to the occupants or to maintenance personnel.

The vinyl floor tiles in the three housing units inspected were in good condition, but, should they become broken or damaged, asbestos fibers may be released. The recent EPA clarification of the definition for damaged non-friable materials apparently removes some concerns about the status of these materials at the time of renovation or demolition. Inspection of these normally non-friable materials prior to demolition is required, but, if they are in good condition at the time, they may be left in place as long as planned demolition procedures will not release a significant amount of asbestos fibers. However, if demolition will subject these non-friable materials to grinding, sanding, or abrading, or if demolition involves burning of the structure or debris from the structure, all forms of ACM, including these floor tiles, must be removed in advance.

The vinyl floor tiles should be left in place and managed under an O&M program. The vinyl floor tiles should be removed during a planned renovation of the units, in accordance with the regulations applicable at the time.

The expansion joints on the heating units and roofing materials were the only other suspect materials noted, and should also be managed under an O&M program. Care should be taken during renovations or demolition to identify suspect materials that may have been hidden from the view of the assessment team. The suspect materials observed by the field team, and any hidden suspect materials found later, should be analyzed for the presence of asbestos prior to being disturbed.

APPENDIX A.1. FIELD DATA, ASBESTOS SAMPLING

0805

SITE SURVEY LOG

CLIENT Argonne National Labs WESTON WORK ORDER NO. 2104-13-01

FACILITY/BLDG. NO. Elrama Family Housing, Unit 586

FACILITY CONTACT Sandy Ricketts TELEPHONE NUMBER (412) 777-1231

TECHNICIAN NAME Michael Kadley SIGNATURE Michael Kadley

TECHNICIAN NAME Rob Erga SIGNATURE

TIME ARRIVED 1530 TIME DEPARTED 1620 DATE 02 Mar 90
dd mmm yy

SPECIFIC SITE ACTIVITIES, COMMENTS, INTERVIEW RESULTS & BRIEF DESCRIPTION OF FACILITY

The units surveyed at Elrama were chosen by Sandy Ricketts based on the availability of the various occupants. According to Mrs Ricketts, all the units are basically the same, and any renovations done to the units involved all the units, except for minor repairs.

Unit 586 is a three bedroom Cupehart-style dwelling with wood shingles on the outside walls, and tar shingles on the roof. Inside is covered by vinyl floor tile, with plaster board walls and ceiling. Pipe runs below the attic are bare. Runs in the attic are covered by an aircell-type insulation. There are no transite shingles on outside walls. The units sets on a concrete base. The pipes in the attic were covered by a blown-in fiberglass insulation (not sampled). The areas for the closets are included with the areas for the rooms in which the closets occur.

Two pipe run samples, 6 floor tile samples, and 4 dust samples were taken.

ACTIVITY CHECKLIST

Interviews Completed	No	Number of Samples	12
Drawings Reviewed	No	Survey Form Completed	Yes
Drawings Attached	Yes	Site Log Completed	Yes
Visual Inspection	Yes	Chain-of-Custody Initiated	Yes
Number of Photos	2	Exp. Assess. Form Init.	Yes
Q.A. Check ✓	SIGNATURE Michael Skotnicki	DATE 21 MAR 90 (dd mmm yy)	

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WESTON

ASBESTOS SURVEY DATA

0807

BLDG. NO.: 5816
INSTALLATION 0218

TASK TEAM MEMBERS
Michael Kindley
Bert Ergo

W.O. No. 2104-13-01
CLIENT: ARGONNE NATIONAL LAB

BLDG. NAME: Elrama Family Housing Unit 5816
BLDG. DESCRIPTION: Cape Cod

DATE (dd/mm/yy): 02/03/90
TIME ARRIVED: 1230

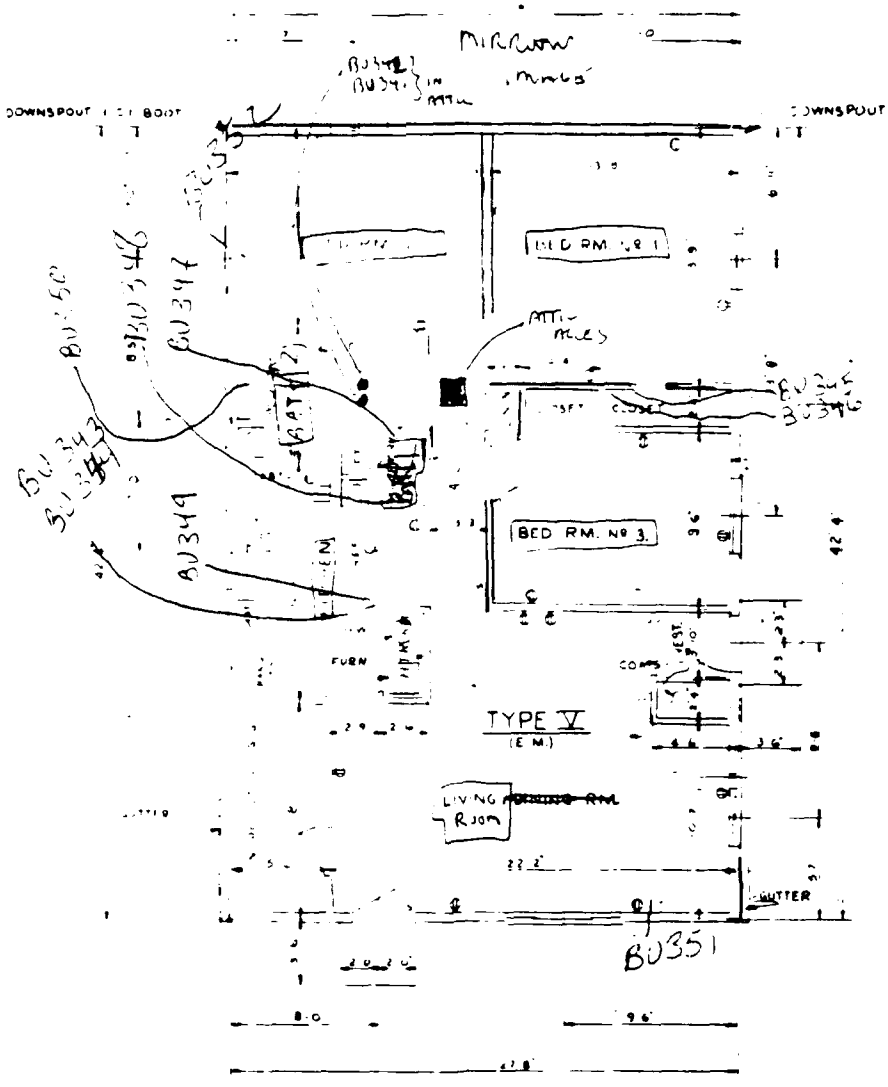
ITEM NO.	LAB SAMPLE NO.	BASE NO.	STATE	UNIT NO.	SAMPLE CODE	AREA	QUANTITY	PHOTO	E.A. FORM NO.	NOTES
1.	910131411	218	PA	5816	AIFT	ATTIC	1110	Y	1115108	01
2.	910131412	218	PA	5816	AIFT	ATTIC	1110	Y	1115106	01
3.	910131413	218	PA	5816	AIFT	KITCHEN	1315	-	1115107	02
4.	910131414	218	PA	5816	AIFT	KITCHEN	1315	-	1115108	02
5.	910131415	218	PA	5816	AIFT	BEDROOM 3	1312	-	1115109	02
6.	910131416	218	PA	5816	AIFT	BEDROOM 3	1318	-	1115110	—
7.	910131417	218	PA	5816	AIFT	BATH 1	1114	-	1115111	02
8.	910131418	218	PA	5816	AIFT	BATH 1	1112	-	1115112	02
9.	910131419	218	PA	5816	AITD	KITCHEN	1111	-	1111	03
10.	910131510	218	PA	5816	AITD	BATH 2	1111	-	1111	03
11.	910131511	218	PA	5816	AITC	LIVING ROOM	1111	-	1111	04
12.	910131512	218	PA	5816	AITD	BEDROOM 2	1111	-	1111	04

NOTE NO.	NOTES/REMARKS/COMMENTS/DETAILS/OTHER MATERIALS, QUANTITY, ETC.
01	Airwall-type material on two pipe runs <4" pipe - probably hot water and domestic water lines. Lines are covered by blown-in insulation. Lines cant be seen from attic access
02	Light red 9" x 9" floor tile
03	Red 9" x 9" floor tile
04	Gray 9" x 9" floor tile. Also in Living Room, Hall, Bedroom 2, and Bedroom 3, Bath 1, and Bath 2. Damaged in Bath 2
05	Black 9" x 9" floor tile. Also in Living Room, Hall, Bedroom 3, Bedroom 2, and Bedroom 1. Occurs in closets
06	Off-white 9" x 9" floor tile
07	Gray-green 9" x 9" floor tile. Also in Hall.
08	Dust in ductwork.
09	There is a cloth expansion joint, but it couldn't be sampled without

TECHNICIAN SIGNATURE Michael Kindley
QUALITY ASSURANCE SIGNATURE Michael Skotnicki

ASBESTOS SURVEY DATA (CONTINUED)

NOTE NO.	NOTES/REMARKS/COMMENTS/DETAILS/OTHER MATERIALS, QUANTITY, ETC.
	pulling a hole in the material


DOWNSPOUT
DOWNSPOUT
BED RM. No 1
BED RM. No 3.
BATH
FURN
TYPE V
(E.M.)
LIVING RM
GUTTER
BU351

UNIT S-86

0899

SITE SURVEY LOG

CLIENT Argonne National Labs WESTON WORK ORDER NO. 2104-13-01

FACILITY/BLDG. NO. Elrama Family Housing, Unit 599

FACILITY CONTACT Sandy Ricketts TELEPHONE NUMBER (412) 777-1231

TECHNICIAN NAME Michael Kudley SIGNATURE Michael Kudley

TECHNICIAN NAME Rolf Eggs SIGNATURE Rolf Eggs

TIME ARRIVED 0115 TIME DEPARTED 1010 DATE 06 Mar 90
dd mmm yy

SPECIFIC SITE ACTIVITIES, COMMENTS, INTERVIEW RESULTS & BRIEF DESCRIPTION OF FACILITY

Unit 599 is a three bedroom, Capehart-style dwelling, with wooden shingles on outside walls, and tar shingles on roof. Inside covered by vinyl flooring; walls and ceilings are covered by plaster board. All pipe runs below ceiling are bare of insulation. There is a woven expansion joint in Utr Rm; was not sampled. The only way to sample the expansion joint would have destroyed the joint. The housing unit sets on a concrete pad.

The areas for the closets are included with the areas for the rooms in which the closets occur.

John Fratto from the DEH Office will accompany us today. Mr. Ricketts is out sick.

There are two pipe runs in the attic covered by drywall-type material. These pipes are obscured from view by spray-in insulation. Five floor tile, 2 pipe insulations, and 4 dust samples taken.

Mr Fratto said that he believed that pipes in the attic were "dead"

ACTIVITY CHECKLIST

Interviews Completed	No	Number of Samples	11
Drawings Reviewed	No	Survey Form Completed	Yes
Drawings Attached	Yes	Site Log Completed	Yes
Visual Inspection	Yes	Chain-of-Custody Initiated	Yes
Number of Photos	2	Exp. Assess. Form Init.	Yes
Q.A. Check	✓	SIGNATURE	Michael Skotnicki
		DATE	21 MAR 90 (dd mmm yy)

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WESTON

ASBESTOS SURVEY DATA

0811

BLDG. NO.: 5911
INSTALLATION 0128

TASK TEAM MEMBERS
Michael Kindley
Rolf Erga

W.O. No. 2104-13-01
CLIENT: ARGONNE NATIONAL LAB

BLDG. NAME: Elcona Family Housing Unit 5911
BLDG. DESCRIPTION: Cupchart

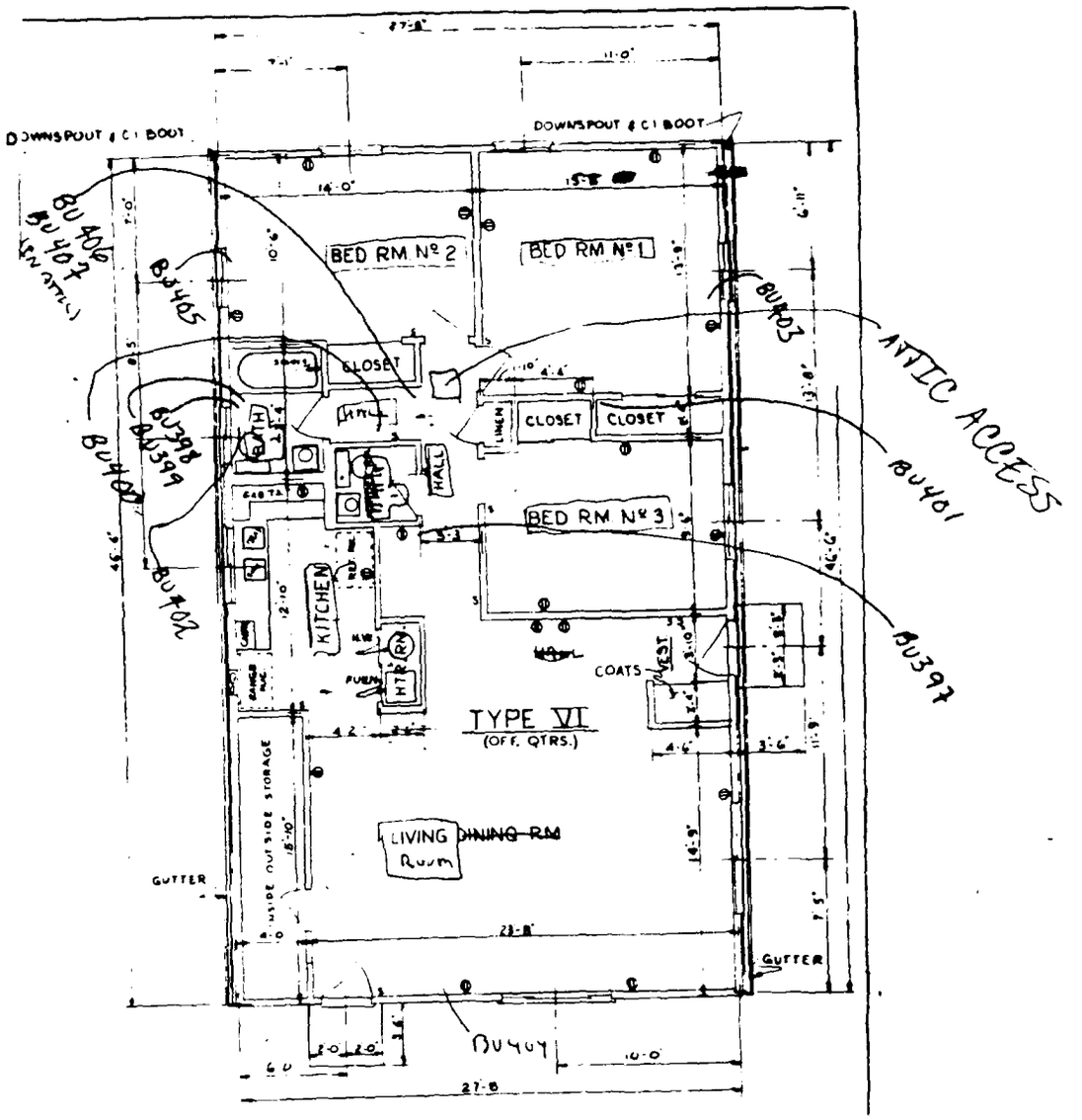
DATE (dd/mm/yy): 02/02/90
TIME ARRIVED: 0915

ITEM NO.	LAB SAMPLE NO.	BASE NO.	STATE	UNIT NO.	SAMPLE CODE	AREA	QUANTITY	PHOTO	E.A. FORM NO.	NOTES
1.	B1013017	28	PA	5911	AFIT	KITCHEN	192	=	11101D	01
2.	B1013018	28	PA	5911	AFIT	BATHRM 2	887	=	11102E	02
3.	B1013019	28	PA	5911	AFIT	BATHRM 2	117	=	11104F	02
4.	B1013020	28	PA	5911	AFIT	KITCHEN	4	=	11103A	04
5.	B1013021	28	PA	5911	AFIT	BEDROOM 3	139	=	11103B	03
6.	B1013022	28	PA	5911	AITD	BATHRM 2	—	=	—	2D
7.	B1013023	28	PA	5911	AITD	BEDROOM 3	—	=	—	3D
8.	B1013024	28	PA	5911	AITD	LIVING ROOM	—	=	—	2D
9.	B1013025	28	PA	5911	AITD	BEDROOM 2	—	=	—	2D
10.	B1013026	28	PA	5911	AIPI	ATTIC	1100	Y	11103C	05
11.	B1013027	28	PA	5911	AIFI	ATTIC	1100	Y	11103D	06
12.	—	—	—	—	A—	—	—	—	—	—

NOTE NO.	NOTES/REMARKS/COMMENTS/DETAILS/OTHER MATERIALS, QUANTITY, ETC.
01	Red 9 x 9" floor tile. Also in Kitchen
02	Gray 9" x 9" floor tile. Also in Living Room, Hall, Bath 1, Bedroom 1, Bedroom 2, and Bedroom 3
03	Gray-green 9" x 9" floor tile. Also in Hall
04	Off-white 9" x 9" floor tile Also occurs in Living Room
05	Black 9" x 9" floor tile. Also in Hall, Living Room, Bedroom 2, and Bedroom 3 Occurs in closets.
06	Dust in ducts. Dust in kitchen covered by refridgerator.
07	Pipes in attic covered by corrugated-type insulation. No fitting materials. Runs just butted together. Cloth wrap on outside. Pipes ~~covered~~ obscured by blown-in material Quantity = linear feet Pipes are less than 4" in diameter.

TECHNICIAN SIGNATURE Michael Kindley

QUALITY ASSURANCE SIGNATURE Michael Skotnicki


DOWNSPOUT & C.I BOOT
DOWNSPOUT & C.I BOOT
BU 406
BU 407
BU 405
BU 403
ATTIC ACCESS
BU 401
BU 398
BU 399
BU 400
BU 402
BU 397
BED RM Nº 2
BED RM Nº 1
BED RM Nº 3
CLOSET
CLOSET
CLOSET
LINEN
HALL
KITCHEN
COATS
WEST
TYPE VI
(OFF. QTRS.)
LIVING
DINING RM
GUTTER
GUTTER
OUTSIDE STORAGE
BU 404
14'-0"
11'-0"
23'-8"
27'-8"

Unit S-89

0513

SITE SURVEY LOG

CLIENT Argonne National Labs WESTON WORK ORDER NO. 2104-13-01

FACILITY/BLDG. NO. Elrama Family Housing, Unit 5100

FACILITY CONTACT Sandy Ricketts TELEPHONE NUMBER (412) 777-1231

TECHNICIAN NAME Michael Kirkley SIGNATURE Michael Kirkley

TECHNICIAN NAME Rolf Engi SIGNATURE Rolf Engi

TIME ARRIVED 1015 TIME DEPARTED 1100 DATE 06 / Mar 90
dd mmm yy

SPECIFIC SITE ACTIVITIES, COMMENTS, INTERVIEW RESULTS & BRIEF DESCRIPTION OF FACILITY

Unit 5100 is a three bedroom, Capehart-style unit, with wooden shingles on outside walls, and tar shingles on roof. The unit sets on a concrete pad. Inside, the floors are covered by vinyl flooring; the walls and ceiling are covered by plaster board. There is an expansion joint on the furnace duct, but we couldn't sample it without putting a hole in the material. Mr Frutto, from the DEH said that he was sure that the expansion joint material was not asbestos. All pipes below ceiling were bare of insulation. There are no transite shingles on outside walls either.

There are two pipe runs in the attic covered by a gray, airsell-type insulation. The pipes are obscured from view by blown-in insulation. These are probably the "dead" lines that Mr Frutto spoke of.

There were three floor tile, two pipe run, and four dust samples taken.

There was a misunderstanding about the pipe runs. The lines aren't dead, but are the hot water lines leading from the HTR Rm

ACTIVITY CHECKLIST

Interviews Completed	No	Number of Samples	9
Drawings Reviewed	No	Survey Form Completed	Yes
Drawings Attached	Yes	Site Log Completed	Yes
Visual Inspection	Yes	Chain-of-Custody Initiated	Yes
Number of Photos	2	Exp. Assess. Form Init.	Yes
Q.A. Check ✓	SIGNATURE Michael Skotnicki	DATE 21 / MAR / 90 (dd mmm yy)	

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WESTON

ASBESTOS SURVEY DATA

0815

BLDG. NO.: S 1 10 10
INSTALLATION 0 2 1 8

TASK TEAM MEMBERS
Rolf Ergo
Michael Kindley

W.O. No. 2104-13-01
CLIENT: ARGONNE NATIONAL LAB

BLDG. NAME: Elcano Family Housing Unit 5100
BLDG. DESCRIPTION: Cape Cod

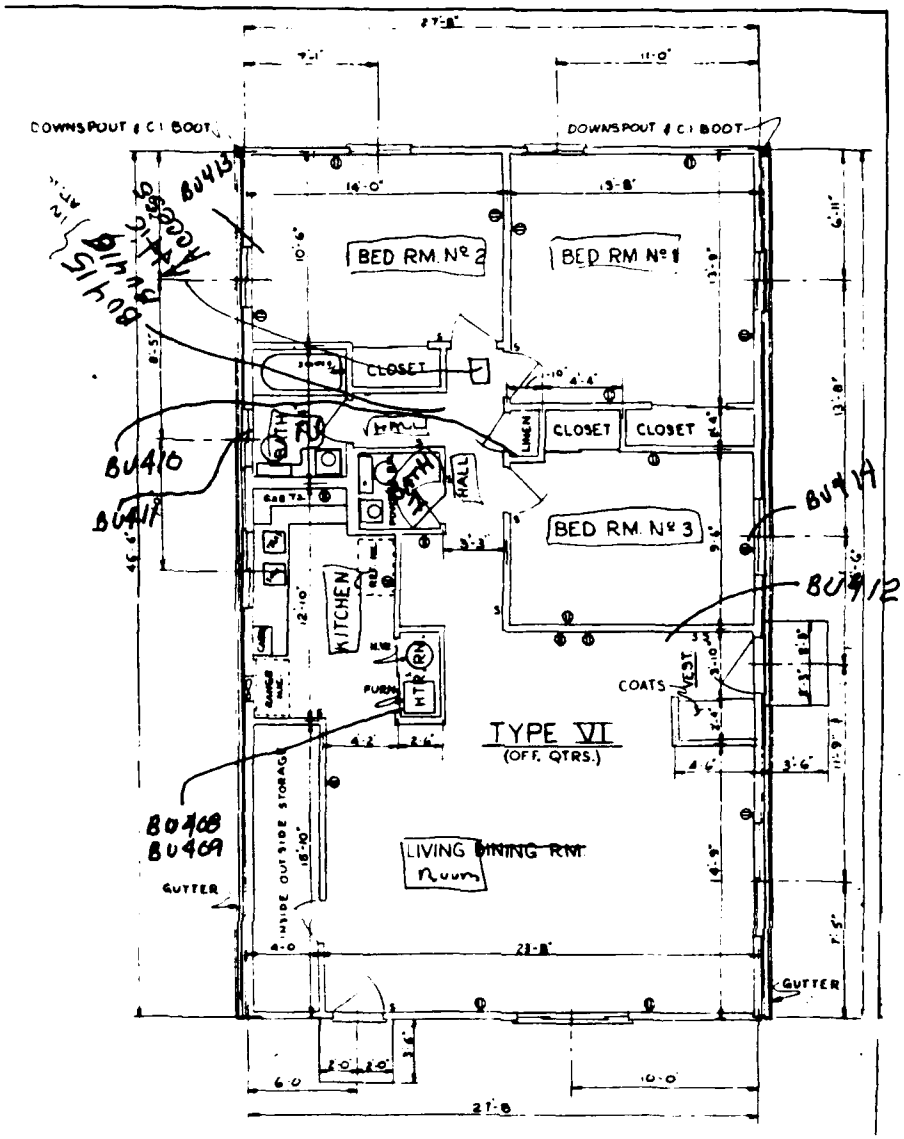
DATE (dd/mm/yy): 06/03/90
TIME ARRIVED: 1012

ITEM NO.	LAB SAMPLE NO.	BASE NO.	STATE	UNIT NO.	SAMPLE CODE	AREA	QUANTITY	PHOTO	E.A. FORM NO.	NOTES
1.	B0218010	218	PA	5100	AIFT	KITCHEN	80	-	HOUSE	01
2.	B0218011	218	PA	5100	AIFT	KITCHEN	4114	-	HOUSE	02
3.	B0218012	218	PA	5100	AIFT	HALL	134	-	HOUSE	02
4.	B0218111	218	PA	5100	AITD	BATH 1 2	1	-	1	03
5.	B0218112	218	PA	5100	AITD	LIVING ROOM	1	-	1	03
6.	B0218113	218	PA	5100	AITD	BEDROOM 2	1	-	1	03
7.	B0218114	218	PA	5100	AITD	BEDROOM 3	1	-	1	03
8.	B0218115	218	PA	5100	AIPI	ATTIC	1	Y	HOUSE	05
9.	B0218116	218	PA	5100	AIPI	ATTIC	1	Y	HOUSE	05
10.	____	-	-	-	AI			-		
11.	____	-	-	-	AI			-		
12.	____	-	-	-	AI			-		

NOTE NO.	NOTES/REMARKS/COMMENTS/DETAILS/OTHER MATERIALS, QUANTITY, ETC.
01	Black 9" x 9" floor tile.
02	Tan 9" x 9" floor tile. Also in Living Room, Hall, Bath 1, Bath 2, Bedroom 1, Bedroom 2, and Bedroom 3.
03	Brown 9" x 9" floor tile. Also in Living Room, Bedroom 1, Bedroom 2, and Bedroom 3. Occurs in closets.
04	Dust in ducts.
05	Pipe runs covered by gray, aircell-type material. Cloth wrap over top. Blown-in insulation obscures view of pipes from attic access panel.

TECHNICIAN SIGNATURE Michael Kindley

QUALITY ASSURANCE SIGNATURE Michael Skotnicki


DOWNSPOUT & C.I. BOOT
DOWNSPOUT & C.I. BOOT
BU413
BU415
BU410
BU411
BU414
BU412
BU408
BU409
BED RM. Nº 2
BED RM. Nº 1
BED RM. Nº 3
CLOSET
CLOSET
CLOSET
LINEN
BATH
BATH
HALL
HALL
KITCHEN
COATS
TYPE VI
(OFF. QTRS.)
LIVING DINING RM.
GUTTER
GUTTER
INSIDE OUT SIDE STORAGE

Unit S-100

APPENDIX A.2. LABORATORY DATA, ASBESTOS SAMPLES

BULK SAMPLE ANALYSIS SUMMARY

Weston W.O. No. 2104-13-01-0000

Sample Number BU341 through Sample BU348

AO LAB ID NO	CLIENT/CLIENT ID	LOCATION	MATERIAL DESCRIPTION*	DATE RECEIVED	RESULTS** CH	AM	CR	OT	TL	LAYERS	ANALYST
BU341	28-PA-S80-API	ATTIC	F, PIPE RUN	03/06/90	10	ND	ND	ND	10	Yes	06806
BU342	28-PA-S80-API	ATTIC	F, PIPE RUN	03/06/90	5	ND	ND	ND	5	No	06806
BU343	28-PA-S80-AFT	KIT	NF, RD, 9X9 FT	03/06/90	3	ND	ND	ND	3	No	06806
BU344	28-PA-S80-AFT	KIT	NF, RD, 9X9 FT	03/06/90	3	ND	ND	ND	3	No	06806
BU345	28-PA-S80-AFT	BEDRM1	NF, GY, 9X9 FT	03/06/90	3	ND	ND	ND	3	No	06806
BU346	28-PA-S80-AFT	BEDRM1	NF, BK, 9X9 FT	03/06/90	2	ND	ND	ND	2	No	06806
BU347	28-PA-S80-AFT	BATH 1	NF, WH, 9X9 FT	03/06/90	1	ND	ND	ND	1	No	06806
BU348	28-PA-S80-AFT	BATH 1	NF, GY, 9X9 FT	03/06/90	2	ND	ND	ND	2	No	06806
BU397	28-PA-S99-AFT	HALL	NF, RD, 9X9 FT	03/08/90	3	ND	ND	ND	3	No	06806
BU398	28-PA-S99-AFT	BATH2	NF, GY, 9X9 FT	03/08/90	3	ND	ND	ND	3	No	06806
BU399	28-PA-S99-AFT	BATH2	NF, GY, 9X9 FT	03/08/90	2	ND	ND	ND	2	No	06806
BU400	28-PA-S99-AFT	HALL	NF, WH, 9X9 FT	03/08/90	3	ND	ND	ND	3	No	06806
BU401	28-PA-S99-AFT	BEDRM1	NF, BK, 9X9 FT	03/08/90	3	ND	ND	ND	3	No	06806
BU406	28-PA-S99-API	ATTIC	F, PIPE INSUL	03/08/90	5	ND	ND	ND	5	Yes	06806
BU407	28-PA-S99-API	ATTIC	F, PIPE INSUL	03/08/90	10	ND	ND	ND	10	Yes	06806
BU408	28-PA-S100-AFT	KIT	NF, BK, 9X9 FT	03/08/90	3	ND	ND	ND	3	No	06806
BU409	28-PA-S100-AFT	KIT	NF, TN, 9X9 FT	03/08/90	3	ND	ND	ND	3	No	06806
BU410	28-PA-S100-AFT	HALL	NF, BR, 9X9 FT	03/08/90	3	ND	ND	ND	3	No	06806
BU415	28-PA-S100-API	ATTIC	F, PIPE INSUL	03/08/90	5	ND	ND	ND	5	Yes	06806
BU416	28-PA-S100-API	ATTIC	F, PIPE INSUL	03/08/90	25	ND	ND	ND	25	Yes	06806

* MATERIAL DESCRIPTION

Friable[1], Color[2], System[3], Type

** RESULTS

CH - Chrysotile
AM - Amosite
CR - Crocidolite
OT - Other
TL - Total

FRIABLE[1]

F - Friable
NF - Non-Friable

COLOR[2]

BK - Black
BL - Blue
BR - Brown
GR - Green
GY - Gray
RD - Red
TN - Tan
WH - White
YL - Yellow

SYSTEM[3]

CHW - Chilled Water
DOM - Domestic Water
HHW - Heating Hot Water
STM - Steam
UNK - Unknown

All analyses are performed in accordance with the methods set forth in U.S. EPA 600/M4-82-020, as ammended. Weston's Optical Microscopy Laboratory is accredited by the National Institute of Standards and Technology's National Voluntary Laboratory Accreditation Program for asbestos fiber analysis (Laboratory Code 1254).

ROY F. WESTON, INC.
1635 PUMPHREY AVE.
AUBURN, AL 36830
PHONE: (205) 826-6100
FAX: (205) 826-8232

Transmission Electron Microscopy
Asbestos Summary Report

Client: Argonne National Laboratories Weston W.O. No.: 2104-13-01-0000

Sample Type: Dust Sampling Location: Elrama

QUALITATIVE ANALYSIS

DUST WIPE SAMPLES: A generous loading of dust was collected on a pre-wetted, 25 square centimeter section of a cleanroom wipe. The wipe was placed in a two ounce wide mouth collection vial and returned to the laboratory. Ten to fifteen milliliters of filtered, deionized water was added to suspend the dust. The suspension was ultrasonically dispersed and the coarse fraction was allowed to settle. A drop of the suspension was placed on a Formvar coated 200 mesh Cu TEM grid and allowed to dry. The grid was carbon coated as above and examined by transmission electron microscopy at 120 kilovolts accelerating voltage.

ANALYTICAL RESULTS

SAMPLE IDENTIFICATION	RESULTS
BU349-28-PA-S86-ATD	Negative
BU350-28-PA-S86-ATD	Negative
BU351-28-PA-S86-ATD	Positive
BU352-28-PA-S86-ATD	Positive
BU402-28-PA-S99-ATD	Negative
BU403-28-PA-S99-ATD	Negative
BU404-28-PA-S99-ATD	Positive
BU405-28-PA-S99-ATD	Negative
BU411-28-PA-S100-ATD	Negative
BU412-28-PA-S100-ATD	Negative
BU413-28-PA-S100-ATD	Positive
BU414-28-PA-S100-ATD	Positive

Greg Hall
(Approved for Transmittal)

3/30/90
(Date)

* This test report relates only to the specific items tested.
** These sample results may only be reproduced in full, and are valid only if approved for transmittal.